

CLAIMS

1. A fuel cell stack (1), comprising:

fuel cells (20) effecting power generation upon supply of an anode gas and a cathode gas, each of the fuel cells (20) comprising;

an anode separator (23) comprising an anode gas passage (32) which has a meandering configuration with two or more bent portions (511, ..., 51m);

a cathode separator (24) comprising a cathode gas passage (36) which has a meandering configuration with bent portions (521, ..., 52m), the number of the bent portions of the cathode gas passage being equal to the number of the bent portions of the anode gas passage, the cathode gas passage (36) and the anode gas passage (32) forming gas flows that are in parallel and in opposite directions to each other; and

a through-hole (33m, 37m) which is provided in a most downstream bent portion (51m, 52m) in at least one of the anode gas passage (32) and the cathode gas passage (36), the through-hole allowing movement of moisture through the fuel cells (20).

2. The fuel cell stack (1) as defined in claim 1, wherein the fuel cell stack (1) has a square shape cross-section and further comprises an anode gas supply manifold (31) which supplies the anode gas to the anode gas passage (32) of each fuel cell (20);

an anode effluent exhaust manifold (34) which recovers an anode

effluent from the anode gas passage (32) of each fuel cell (20), the anode effluent exhaust manifold (34) being arranged diagonally with respect to the anode gas supply manifold (31) in the cross-section of the fuel stack (1);

a cathode gas supply manifold (35) which supplies a cathode gas to the cathode gas passage (36) of each fuel cell (20);

a cathode effluent exhaust manifold (38) which recovers cathode effluent from the cathode gas passage (36) of each fuel cell (20), the cathode effluent exhaust manifold (38) being arranged diagonally with respect to the cathode gas supply manifold (35) in the cross-section of the fuel cell stack (1);

wherein the anode gas supply manifold (31) and the cathode effluent exhaust manifold (38) are arranged in parallel along a first side (29) of the stacking surface of the fuel cell (20), while the anode effluent exhaust manifold (34) and the cathode gas supply manifold (35) are arranged in parallel along a second side (30), which is opposed to the first side (29) with respect to the cross-section of the fuel cell stack (1).

3. The fuel cell stack (1) as defined in claim 1 or 2, wherein the anode gas passage (32) and the cathode gas passage (36) respectively comprise an even number of bent portions (511 through 514, 521 through 524), the number being four or more, and wherein, in addition to the most downstream bent portion (514, 524), at least one of even-numbered bent portions (512, 522) as counted from an inlet side, other than the most downstream bent portion (514, 524), comprises a through-hole (332, 372)

which allows movement of moisture through the fuel cells (20).

4. The fuel cell stack (1) as defined in claim 1 or 2, wherein the anode gas passage (32) and the cathode gas passage (36) respectively comprise an odd number of bent portions (511, ..., 51m, 521, ..., 52m).

5. The fuel cell stack (1) as defined in claim 4, wherein the odd number is five or more, and wherein, in addition to the most downstream bent portion (517, 527), at least one of bent portions (515, 516, 525, 526) situated halfway on the downstream side, other than the most downstream bent portion (517, 527), comprises a through-hole (335, 336, 375, 376) which allows movement of moisture through the fuel cells (20).

6. The fuel cell stack (1) as defined in any one of claims 1 through 5, wherein the fuel stack (1) further comprises a drain manifold (45,46) which drains water in the through-hole (33m, 37m) to outside of the fuel cell stack (1).

7. The fuel cell stack (1) as defined in any one of claims 1 through 6, wherein, adjacent fuel cells (20) are provided with an LLC passage (27) therebetween which is substantially superimposed in a stacking direction on the cathode gas passage (36) and through which a coolant flows in the same direction as a cathode gas that flows in the cathode gas passage (36).

8. The fuel cell stack (1) as defined in claim 7, wherein the fuel cell stack (1) comprises supply manifolds (31, 35, 39) that respectively distribute the anode gas, the cathode gas, and the coolant to the fuel cells (20), and exhaust manifolds (34, 38, 40) that respectively recover an anode gas, a cathode gas, and a coolant from the fuel cells (20), and wherein the anode gas supply manifold (31), the cathode gas exhaust manifold (38) and the coolant exhaust manifold (40) are located in the vicinity with respect to each other, while the anode gas exhaust manifold (34), the cathode gas supply manifold (35) and the coolant supply manifold (39) are located in the vicinity with respect to each other.